

REMARKS

The Examiner's Office Action of July 30, 2003 has been received and its contents reviewed. The Examiner is thanked for the review and consideration of the present application.

By the above actions, claim 1 has been amended to include the subject matter of claim 3, and claims 4 and 32 have been amended to improve form. Accordingly, claims 1-12, and 31 and 32 are pending for consideration, of which claim 1 is independent, and claims 13-30 are withdrawn for consideration in response to an election requirement. In view of these actions and the following remarks, reconsideration of this application is now requested.

Referring now to page 2 of the detailed Office Action, Figures 21-26 are objected to and required to be amended to be designated as --Prior Art--. Attached hereto are five (5) replacement sheets that amend claims 21-26 to be labeled as --Prior Art--. Thus, Applicants respectfully request reconsideration and withdrawal of the objection.

Also on page 2 of the Office Action, the Examiner indicates that the IDS filed January 8, 2001 has not been considered since it does not comply with 37 CFR 1.98(a)(2), which requires a legible copy of each document supplied. Applicants however submit that the paper received at the U.S. Patent and Trademark Office on January 8, 2001 was not an Information Disclosure Statement, but instead a certified copy of the Priority Document. Thus, Applicants submit that there are no outstanding unconsidered IDS Statements.

Claims 1-4, 6, 12 and 31 stand rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Publication No. 11-121448 to Masahiro Kitajima et al. (hereinafter Kitajima). Further, claims 5, 7 and 8 stand rejected under 35 U.S.C. §103(a) as unpatentable over Kitajima in view of U.S. Patent No. 4,442,591 to Haken and claims 9-11 stand rejected under 35 U.S.C. §103(a) as unpatentable over Kitajima in view of European Patent No. 661,732 A2 to Law. In view of the amendments above and the comments provided below, Applicants respectfully traverse these rejections.

As discussed in the previous response, the present invention is directed to a method of forming an insulating film on a semiconductor layer. The present invention includes, as set forth in independent claim 1, (a) loading said substrate including said semiconductor layer on a lower electrode in a processing chamber, and (b) generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an

atmosphere including oxygen and with the substrate heated to a temperature of 300°C, and subjecting said semiconductor layer to the biased plasma, wherein an exposed portion of the semiconductor layer on the substrate is oxidized by the biased plasma in the step (b).

Kitajima, on the other hand, is directed to a silicon oxidation film that is formed by plasma-oxidizing while maintaining silicon substrate temperature at a room temperature. Applicants respectfully submit that, Kitajima does not disclose or suggest that the plasma oxidation of the silicon substrate is carried out at a higher temperature than the room temperature. As now recited in independent claim 1, Applicants respectfully submit that Kitajima does not disclose or suggest generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen and with the substrate heated to a temperature of 300°C. The present invention provides the method of forming the insulating film on the semiconductor layer while heating the substrate to a temperature of 300°C, wherein the exposed portion of the semiconductor layer on the substrate is oxidized by the biased plasma.

Turning to the supporting references, Applicants respectfully submit that none solve the deficiencies of the Kitajima document. In other words, none teach or suggest generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen and with the substrate heated to a temperature of 300°C.

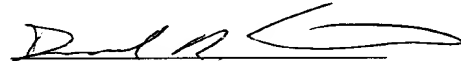
For example, the Haken patent discloses a high-voltage CMOS process in which a gate oxide film is formed by oxidization while the Law document discloses the formation of a silicon oxy-nitride film in a plasma reactant with using SiH₄, NH₃, N₂O and N₂ gas. Law further discloses the formation of a silicon oxy-nitride film in a plasma reactant with using SiH₄, NH₃, N₂O and N₂ gas that. Specifically, the silicon oxy-nitride film is deposited in a reaction to SiH₄ gas, O of N₂O gas, N of NH₃ gas, N₂O gas and N₂ gas. Moreover, in a plasma-enhanced chemical vapor deposition apparatus 10 taught by Law, a susceptor 18 on which a substrate is mounted is connected to ground, a first electrode 16 opposing to the susceptor 18 is connected to an RF power source 36. However, Applicants respectfully assert that only normal plasma is generated in this configuration at a temperature of 250°C or less, and that the biased plasma like in the claimed invention does not occur.

The remaining cited prior art references also fail to suggest or disclose generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen and with the substrate heated to a temperature of 300°C.

In view of the arguments set forth above, Applicants respectfully request reconsideration and withdrawal of all the pending rejections.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Respectfully submitted,



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